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10/717,919	11/21/2003	Ki-hyun Kim	1793.1078	7566

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EXAMINER	
TORRES, JOSEPH D	
ART UNIT	PAPER NUMBER
2112	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/717,919	KIM ET AL.	
	Examiner	Art Unit	
	Joseph D. Torres	2112	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 January 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10,12-31 and 33-45* is/are pending in the application.

4a) Of the above claim(s) *1-6,13-27,34-43 and 45* is/are withdrawn from consideration.

5)☒ Claim(s) *12 and 33* is/are allowed.

6)☒ Claim(s) *7-10,28-31 and 44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 January 2008* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of Group II, claims 7-12, 28-33 and 44 in the reply filed on 07/19/2007 is acknowledged. The traversal is on the ground(s) that Group III is statutory. This is not found persuasive because claims 13-21 recite an apparatus comprising a transmission channel. Paragraph [0003] in the Applicant's specification teaches that a spatial medium is a transmission channel. Spatial media is natural phenomena and does not fall into one of the statutory categories of invention.
The requirement is still deemed proper and is therefore made FINAL.
Claims 1-6, 13-27, 34-43 and 45 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected inventions, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 07/19/2007.

Drawings

The drawings were received on 01/10/2008. These drawings are accepted.

Response to Arguments

Applicant's arguments with respect to claims 7-10, 12, 28-31, 33 and 44 have been considered but are moot in view of the new ground(s) of rejection.

Information Disclosure Statement

Applicant and the assignee of this application are required under 37 CFR 1.105 to provide the following information that the examiner has determined is reasonably necessary to the examination of this application.

In response to this requirement, please agree or disagree to the stipulation of each of the following assertions of facts:

Claim 1 recites, "an interleaver which, according to the additional information, performs a hard-decision for successfully decoded data to restore original data, puts a soft output of the second soft decoder in a portion of non-decoded data, performs interleaving of the data, and feeds back the interleaved data to the first soft decoder, wherein the first soft decoder performs repeated decoding".

The Examiner asserts that an Interleaver is a device for rearranging, i.e., interleaving data. Nowhere in the specification does the Applicant teach how a step for performing hard-decision for successfully decoded data to restore original data can be part of an interleaving process. Nowhere in the specification does the Applicant teach how a soft output of the second soft decoder in a portion of non-decoded data can be part of an interleaving process.

The Examiner assumes the following was intended: --a means for performing a hard-decision for successfully decoded data to restore original data, a means for putting a soft output of the second soft decoder in a portion of non-decoded data according to the additional information, and an Interleaver for performing interleaving of the data, and

feeding back the interleaved data to the first soft decoder, wherein the first soft decoder performs repeated decoding--.

Please disagree or agree with the intended language provided by the Examiner.

In response to this requirement, please provide answers to each of the following interrogatories eliciting factual information:

I the Applicant disagreed with the previous, please explain how and why an Interleaver for rearranging data would require a means for performing a hard-decision for successfully decoded data to restore original data and a means for putting a soft output of the second soft decoder in a portion of non-decoded data to interleave data providing support from the specification.

The applicant is reminded that the reply to this requirement must be made with candor and good faith under 37 CFR 1.56. Where the applicant does not have or cannot readily obtain an item of required information, a statement that the item is unknown or cannot be readily obtained may be accepted as a complete reply to the requirement for that item.

This requirement is an attachment of the enclosed Office action. A complete reply to the enclosed Office action must include a complete reply to this requirement. The time period for reply to this requirement coincides with the time period for reply to the enclosed Office action.

Claim Objections

Claims 8-10 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The Preamble in claim 7 recites, "a decoding apparatus".

Claims 8-10 fail to recite any structural elements or structural interconnections between existing elements further limiting claim 7. Claims 8-10 instead recite functional language pertaining to methods and/or steps of a method.

While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function, **because apparatus claims cover what a device is, not what a device does** (Hewlett-Packard Co. v. Bausch & Lomb Inc., 909 F.2d 1464, 1469, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990)). Thus, if a prior art structure is capable of performing the intended use as recited in the preamble, or elsewhere in a claim, then it meets the claim.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 7-10 and 12 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claim 1 recites, "an interleaver which, according to the additional information, performs a hard-decision for successfully decoded data to restore original data, puts a soft output of the second soft decoder in a portion of non-decoded data, performs interleaving of the data, and feeds back the interleaved data to the first soft decoder, wherein the first soft decoder performs repeated decoding".

The Examiner asserts that an Interleaver is a device for rearranging, i.e., interleaving data. Nowhere in the specification does the Applicant teach how a step for performing hard-decision for successfully decoded data to restore original data can be part of an interleaving process. Nowhere in the specification does the Applicant teach how a soft output of the second soft decoder in a portion of non-decoded data can be part of an interleaving process.

The Examiner assumes the following was intended: --a means for performing a hard-decision for successfully decoded data to restore original data, a means for putting a soft output of the second soft decoder in a portion of non-decoded data according to the additional information, and an Interleaver for performing interleaving of the data, and feeding back the interleaved data to the first soft decoder, wherein the first soft decoder performs repeated decoding--.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 7-10 and 28-31 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is not clear what data "the data" in line 11 of claim 7 refers to.

It is not clear what data "the data" in line 10 of claim 28 refers to.

Claims 7-10 and 44 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements.

Claims 7-10 and 44 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01.

The Preamble in claim 7 recites, "a decoding apparatus".

Claim 7 recites, "performs a hard-decision for successfully decoded data to restore original data, puts a soft output of the second soft decoder in a portion of non-decoded data, performs interleaving of the data". Missing is any structural element and the structural cooperative relationships for such missing structural element that can be considered part of "a decoding apparatus" for performing "a hard-decision for successfully decoded data to restore original data". Missing is any structural element

and the structural cooperative relationships for such missing structural element that can be considered part of "a decoding apparatus" for putting a soft output of the second soft decoder in a portion of non-decoded data. Missing is any structural element and the structural cooperative relationships for such missing structural element that can be considered part of "a decoding apparatus" the relationship between interleaved data, soft output of the second soft decoder and interleaved data.

Claims 8-10 fail to recite any structural elements (omitting essential elements) and/or structural interconnections (omitting essential structural cooperative relationships of elements) between existing elements further limiting claim 7. Claims 8-10 instead recite functional language pertaining to methods and/or steps of a method.
While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function, **because apparatus claims cover what a device is, not what a device does** (Hewlett-Packard Co. v. Bausch & Lomb Inc., 909 F.2d 1464, 1469, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990)). Thus, if a prior art structure is capable of performing the intended use as recited in the preamble, or elsewhere in a claim, then it meets the claim.

The preamble in claim 44 recites, "a computer readable medium".
Claim 44 fails to recite any limitation in the body of the claims that can be considered a structural element of "a computer readable medium" further limiting claim 44 or

structurally defining claim 44. That is, the "a computer readable medium" has no defining structural features.

While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function, **because apparatus claims cover what a device is, not what a device does** (Hewlett-Packard Co. v. Bausch & Lomb Inc., 909 F.2d 1464, 1469, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990)). Thus, if a prior art structure is capable of performing the intended use as recited in the preamble, or elsewhere in a claim, then it meets the claim.

The claims are generally narrative and indefinite, failing to conform with current U.S. practice. They appear to be a literal translation into English from a foreign document and are replete with grammatical and idiomatic errors.

The phrase, "an interleaver which, according to the additional information, performs a hard-decision for successfully decoded data to restore original data, puts a soft output of the second soft decoder in a portion of non-decoded data, performs interleaving of the data, and feeds back the interleaved data to the first soft decoder, wherein the first soft decoder performs repeated decoding" in claim 7 is poorly written, replete with grammatical, idiomatic and 112 errors that it is impossible to determine the intended scope of the phrase

For the purposes of advancing prosecution, the Examiner assumes the following was intended: --a means for performing a hard-decision for successfully decoded data to

restore original data, a means for putting a soft output of the second soft decoder in a portion of non-decoded data according to the additional information, and an Interleaver for performing interleaving of the data, and feeding back the interleaved data to the first soft decoder, wherein the first soft decoder performs repeated decoding--.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 7-10, 28-31 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Figure 1 and Background of the Invention in Burd et al. (US 6965652 B1, hereafter referred to as Burd) in view of Song et al. (Hongxin Song, Richard M. Todd, and J. R. Cruz, Low Density Parity Check Codes for Magnetic Recording Channels, IEEE TRANSACTIONS ON MAGNETICS, VOL. 36, NO. 5, SEPTEMBER

2000) [hereafter referred to as Song] in further view of Nakamura; Takahiko et al. (US 6757865 B1, hereafter referred to as Nakamura).

35 U.S.C. 103(a) of claims 7, 28 and 44.

Burd teaches a first soft decoder performing a first soft decoding of input data to correct errors in the input data and outputting first soft-decoded data (Soft Channel Decoder 504 in Figure 1 of Burd); and a second soft decoder receiving the first soft-decoded data, performing a second soft decoding of the first soft-decoded data and outputting second soft-decoded data (Soft linear Block Code Decoder 506 in Figure 1 of Burd) and an Interleaver for performing interleaving of the data, and feeding back the interleaved data to the first soft decoder, wherein the first soft decoder performs repeated decoding (Interleaver 512 in Figure 1 of Burd).

Note: Burd does not teach elements of the channel encoder corresponding the Soft Channel decoder 504, but assumes one of ordinary skill in the art at the time the invention was made would understand the operation of channel encoders. Figure 1 on page 2184 of Song is a teaching reference for channel encoding and in particular and LDPC Encoder followed by a 1/(1+D) partial response channel encoder. Note: LDPC code is interleaved prior to partial response channel encoding. In addition, Interleavers 512 and 514 in Burd comprise an interleaver which, according to the additional information, performs a hard-decision for successfully decoded data to restore original data (Decision Circuitry 118 is part of the second interleaver 114 in Zhang corresponding to interleaver 514 in Burd for performing hard-decision for successfully

decoded data), puts a soft output of the second soft decoder in a space of non-decoded data (unsuccessful data is put back into a space of interleaver 110 corresponding to interleaver 512 in Burd), performs interleaving, and feeds back the interleaved data to the first soft decoder, wherein the first soft decoder performs repeated decoding (interleaver 512 in Burd feeds back the interleaved data to the first soft decoder 504 in Burd).

However Burd does not explicitly teach the specific use of a de-interleaver de-interleaving the first soft-decoded data corresponding to an interleaving order used upon encoding.

Song, in an analogous art, teaches use of a de-interleaver de-interleaving the first soft-decoded data corresponding to an interleaving order used upon encoding (De-interleaver 2 in Figure 1 on page 2184 of Song).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Burd and Zhang with the teachings of Song by including use of a de-interleaver de-interleaving the first soft-decoded data corresponding to an interleaving order used upon encoding. This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that use of a de-interleaver de-interleaving the first soft-decoded data corresponding to an interleaving order used upon encoding would have provided de-interleaving for channel interleaved data (Figure 1 on page 2184 of Song).

However Burd and Zhang do not explicitly teach the specific use of a particular algorithm typically found in the Prior Art for implementing the internal operations of the decoding components of Figure 1 in Burd such as the second soft decoder outputting additional information indicating a success or failure of the decoding of the first soft-decoded data; and a means for performing a hard-decision for successfully decoded data to restore original data, and a means for putting a soft output of the second soft decoder in a portion of non-decoded data according to the additional information. Nakamura, in an analogous art, teaches second soft decoder outputting additional information indicating a success or failure of the decoding of the first soft-decoded data (Step S105 in Figure 21 of Nakamura is a means for outputting additional differential value information for two path metrics indicating a success or failure of the decoding of the first soft-decoded data to a storage device); and a means for performing a hard-decision for successfully decoded data to restore original data (Step s108 in Figure 21 of Nakamura is a means for performing a hard-decision for successfully decoded data to restore original data), and a means for putting a soft output of the second soft decoder in a portion of non-decoded data according to the additional information (Steps S109 and S110 in Figure 21 of Nakamura is a means for putting/replacing a soft output of the second soft decoder in a portion of non-decoded data in Step S110 using to the additional differential value information in Step 109).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Burd and Zhang with the teachings of Nakamura by including use of the particular algorithm in Nakamura for implementing the internal

operations of the decoding components of Figure 1 in Burd. This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that use of the particular algorithm in Nakamura for implementing the internal operations of the decoding components of Figure 1 in Burd would have provided an efficient and effective error correction means for implementing the internal operations of the decoding components (col. 3, lines 7-25 in Nakamura).

35 U.S.C. 103(a) rejection of claims 8 and 29.

Figure 1 of Zhang.

35 U.S.C. 103(a) rejection of claims 9 and 30.

Soft linear Block Code Decoder 506 in Burd is for LDPC code.

35 U.S.C. 103(a) rejection of claims 10 and 31.

Decision Circuitry 118 in Figures 1 and step 208 in Figure 2 in Zhang.

Allowable Subject Matter

Claims 12 and 33 are allowed.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph D. Torres whose telephone number is (571) 272-3829. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jacques Louis-Jacques can be reached on (571) 272-6962. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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